



# Illinois Department of Transportation

## Memorandum

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To: ALL BRIDGE DESIGNERS 03.2  
From: Ralph E. Anderson *Ralph E. Anderson*  
Subject: Drainage Scupper Policy  
Date: January 29, 2003

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This bridge memorandum supersedes the previously issued Bridge Memorandum 00.2 dated August 1, 2000.

The initial 5-year evaluation period has expired in the search for a clog free scupper. This memorandum presents changes to the scupper policy based primarily on field performance.

Standards DS 22 and DS 23 are discontinued due to clogging problems. A new scupper, DS 11, has been developed to fill a need for tight clearances between curb and girder flanges. This scupper is a modified (1' long) DS 12 scupper and performance is expected to be at least as good as the DS 12.

The DS 12 is performing very well, however, field evaluations will continue. The DS 33 is included as an option to be used primarily with large flanged girders.

Details of the new DS 11 and the other current standard scuppers, DS 12 & DS 33 are attached to this memorandum. They are also available in electronic format and can be found in the English Detail Library (DETAILIB.CEL) or in the Metric Detail Library (MDETLIB.CEL) on the IDOT web site.

It is not the intent of this policy to alter standard structural and economic considerations to meet bridge scupper placement needs. Generally, bridge width and economical beam spacing will determine the dimensions of the bridge deck overhang. The scupper type is chosen, based on this policy, to fit the proposed overhang/beam position. At times, minor adjustments to the beam spacings may be appropriate to fit a particular scupper.

RLD/bb24569

Bureau of Bridges and Structures  
Drainage Scupper  
Policy

Purpose:

To improve bridge scupper drainage and bicycle ridability.

Bridge scuppers are required to meet several criteria to function properly. They must effectively collect and convey the deck runoff, carry MS18 (HS20) wheel loads, fit within the physical constraints of the deck and superstructure, and be bicycle safe. Other concerns are the weight of the scupper and ease of construction.

Problems:

1. The bridge deck protective coat (linseed oil) sticks to and roughens the scupper frame during the initial construction application. This contributes to the problem of blocked or clogged inlets.
2. The IDOT DS-33 Drainage Scupper clogs easily, especially at the shallow end, primarily due to the relatively flat slope of the frame. The diameter of the downspout may also be a restriction that leads to blockage.
3. The slotted grates used on standard IDOT scuppers are considered bicycle safe. However, bicycle users have indicated that there is room for improvement. Vane grates are bicycle safe beyond question and offer the best ridability.

Proposed Solutions:

Based on evaluations of the test scuppers to date we have made the following changes to address some of the identified problems.

Added a note requiring the contractor to take appropriate measures to assure that Protective Coat is not applied to the scuppers.

Added a note requiring the grate, frame and downspout to be galvanized.

Developed standard vane grates for all scuppers which meet the requirements of AASHTO M 306.

To address the problem of clogging due to the flat slope of the frame it is recommended that the DS-11 or DS-12 be used whenever possible. Since these scuppers extend only 305 mm (1') or 610 mm (2') from the face of curb, more scuppers will be required to control the hydraulic spread. Another possible concern for clogging is the size of downspout/outlet pipe. Increasing from 152 mm (6") to 254 mm (10") may be desirable. The wider width of the grate is also desirable to reduce splashover on steep slopes. The DS-33 scupper should be used only when the above scuppers do not fit or are not appropriate for the site.

Reasons for Proposed Scuppers:

1. DS-11 and DS-12
  - Good slope in bottom of frame
  - Light weight, good for construction 52 kg (115 lbs.)
  - Good performance record
  - May be oriented in either direction

2. DS-33

- Reaches over beams and girders which may be necessary for certain beam arrangements to physically fit (esp. with bulb tees).
- Light weight, good for construction.

Negatives Associated with Proposed Scuppers:

1. DS-11

- Extends only 300 mm (1') from curb.

2. DS-12

- May not physically fit some situations due to deeper frame.
- Extends only 600 mm (2') from curb

3. DS-33

- Performance, with respect to clogging, is not as good as DS 12

If necessary, all scuppers may be located up to 100 mm (4") from face of curb, when physical obstruction occurs.

When necessary, it is acceptable to partially extend/embed all three scuppers into the curb of the concrete barrier. A maximum of 100 mm (4") will be allowed and must be detailed so that removal of the grate will be permitted for cleaning. Also, when computing the number and locations of scuppers with partial extension under the curb, it will be necessary to use only the exposed length of scupper (from curb to end of scupper).

Scupper grates must use a symmetrical bolt pattern to allow proper grate orientation. Care must be taken to ensure vane grates are installed in the proper direction to accept the deck drainage.

The following scupper designations are listed in order of preference to be shown on the TSL plan.

DS-11

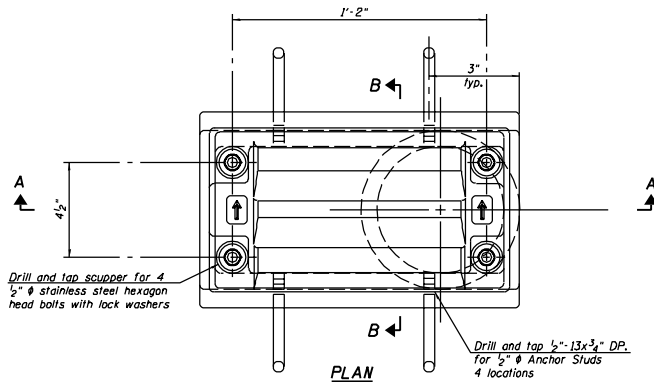
DS-12

DS-33

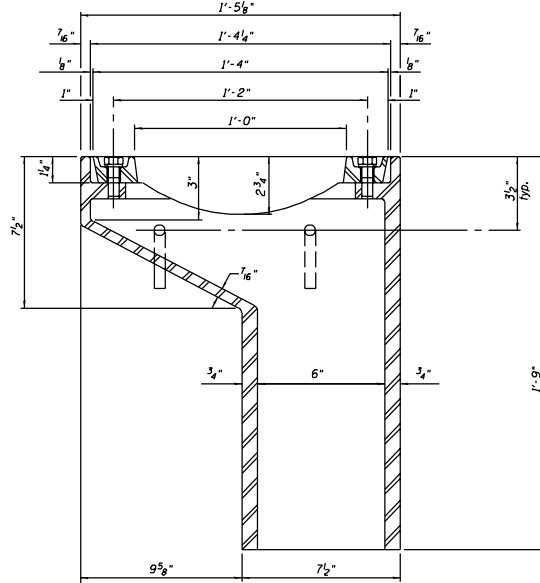
RLD/bb24568

STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

DESIGNED	CHECKED	EXAMINED	PASSED	DATE	SHEET NO.
					SHEETS

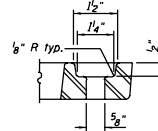


PLAN

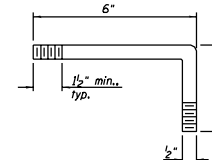


SECTION A-A

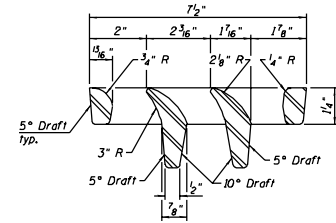
See sheet of for scupper  
location relative to parapet.



BOLT HOLE DETAIL



ANCHOR STUD DETAIL

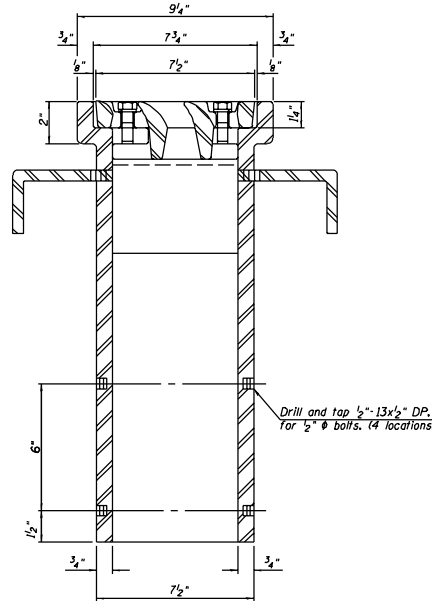


VANE GRATE DETAIL

Notes: All cast iron parts shall be gray iron conforming to the requirements of AASHTO M 105, Class 35B.  
Bolts, anchor studs, washers and nuts shall conform to the requirements of ASTM A 307 and shall be galvanized according to AASHTO M 232.  
The grate, frame and downspout shall be galvanized according to AASHTO M 111 and ASTM A 385. Downspouts located on the exterior side of a painted steel fascia beam shall be painted with the finish coat specified for the exterior side of the fascia beam.  
As an alternate, bolts, anchor studs, washers and nuts may be stainless steel according to Article 1006.29(d) of the Standard Specifications.  
Structural steel weldments of equal sections and of the same configuration may be substituted for cast iron. Filler or full penetration welds shall be used for the weldments. Details shall be submitted to the Engineer for approval.  
The Contractor shall take appropriate measures to assure that Protective Coat is not applied to the scupper.  
Cost of the Grate, Frame, Downspout, Anchor Studs, Bolts, Washers and Nuts including complete installation of the scupper shall be paid for at the contract unit price each for Drainage Scupper, DS-II.

BILL OF MATERIAL

ITEM	UNIT	QUANTITY
Drainage Scupper, DS-II	Each	



SECTION B-B

DRAINAGE SCUPPER, DS-II

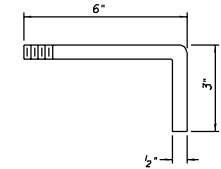
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CHECKED	-
DRAWN	-
CHECKED	-

20
EXAMINED
PASSED
ENGINEER OF BRIDGE DESIGN
ENGINEER OF BRIDGES AND STRUCTURES

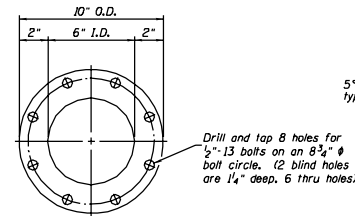
DATE	TIME	NAME	UNIT	POST
SIGNATURE OF DRIVER		CHECKED BY COMMANDER		

SHEET NO.   

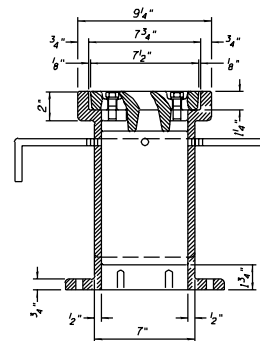
  SHEETS



ANCHOR STUD DETAIL



VIEW C-C



SECTION A-A

**Notes:** All cast iron parts shall be gray iron conforming to the requirements of AASHTO M 105, Class 35B.

Bolts, anchor studs, washers and nuts shall conform to the requirements of ASTM A 307 and shall be galvanized according to AASHTO M 232.

The grate, frame and downspout shall be galvanized according to ASTM M 111 and ASTM A 365. Downspouts located on the interior side of a pointed steel fascia beam shall be painted with the Finish coat specified for the exterior side of the fascia beam.

As an alternate, bolts, anchor studs, washers and nuts may be stainless steel according to Article 106.29(d) of the Standard Specifications.

Structural steel weldments of equal sections and of the same configuration may be substituted for cast iron. Fillet or full penetration welds shall be used for the weldments. Details shall be submitted to the Engineer for approval.

The Contractor shall take appropriate measures to assure that Protective Coat is not applied to the seupper.

Cost of the Grate, Frame, Downspout, Anchor Studs, Bolts, Washers and Nuts including complete installation of the scupper shall be paid for at the contract unit price each for Drainage Scupper, DS-12.

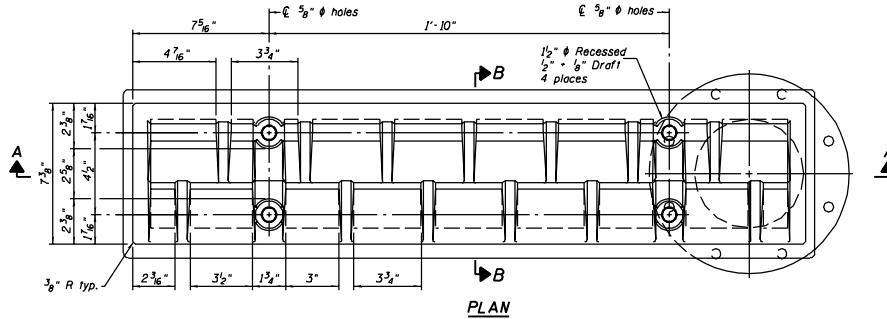
DRAINAGE SCUPPER, DS-12

ITEM	UNIT	QUANTITY
Dredging Scooper, DS-12	Each	

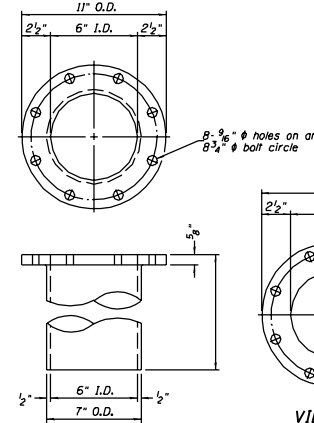
STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

DESIGNED	CHECKED	EXAMINED	PASSED	DATE

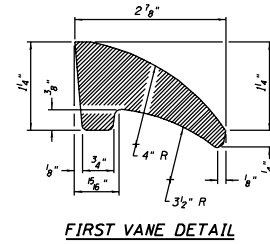
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- SHEETS



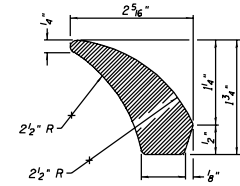
PLAN



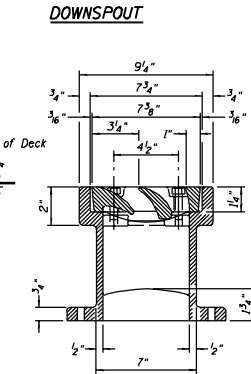
VIEW C-C



FIRST VANE DETAIL

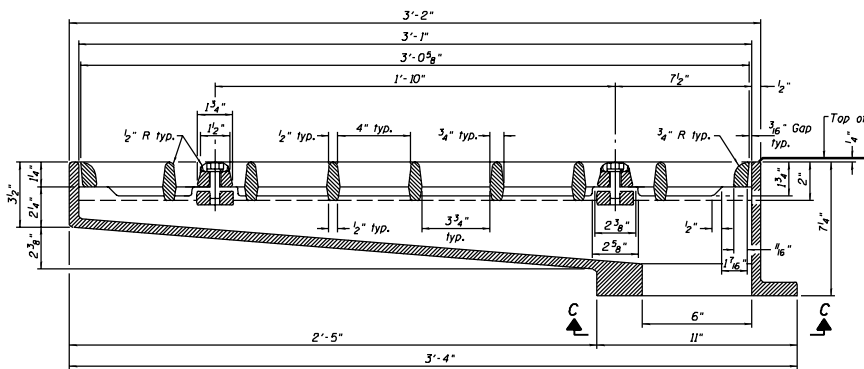


SECOND VANE DETAIL



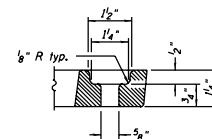
SECTION B-B

Notes: All cast iron parts shall be gray iron conforming to the requirements of AASHTO M 105, Class 35B.  
Bolts, anchor studs, washers and nuts shall conform to the requirements of ASTM A 307 and shall be galvanized according to AASHTO M 232.  
The grate, frame and downspout shall be galvanized according to AASHTO M 111 and ASTM A 385. Downspouts located on the exterior side of a painted steel fascia beam shall be painted with the finish coat specified for the exterior side of the fascia beam.  
As an alternate, bolts, anchor studs, washers and nuts may be stainless steel according to Article 1006.29(d) of the Standard Specifications.  
Structural steel weldments of equal sections and of the same configuration may be substituted for cast iron. Fillet or full penetration welds shall be used for the weldments. Details shall be submitted to the Engineer for approval.  
The Contractor shall take appropriate measures to assure that Protective Coat is not applied to the scupper.  
Cost of the Grate, Frame, Downspout, Anchor Studs, Bolts, Washers and Nuts including complete installation of the scupper shall be paid for at the contract unit price each for Drainage Scupper, DS-33.



SECTION A-A

See sheet of for scupper location relative to parapet.



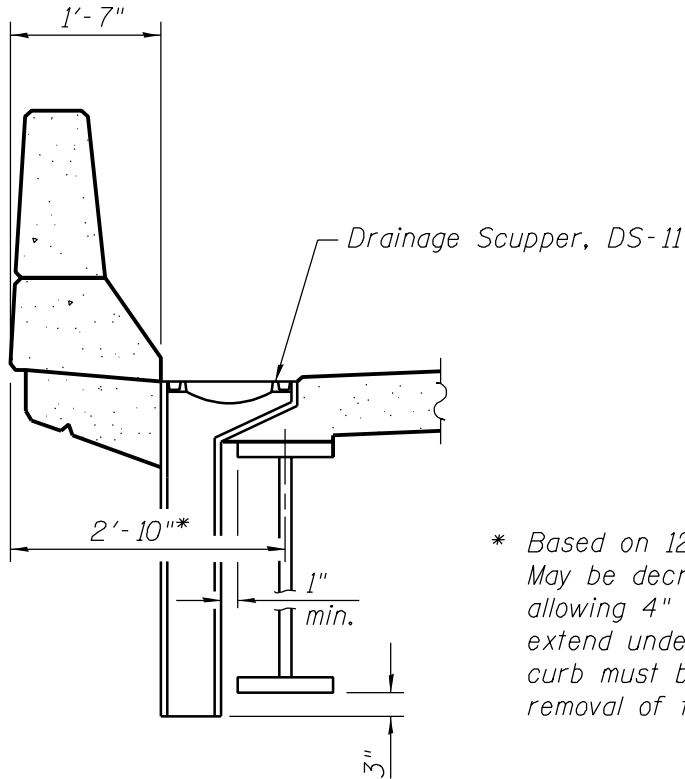
BOLT HOLE DETAIL

DESIGNED	-	20
CHECKED	-	EXAMINED
DRAWN	-	PASSED
CHECKED	-	ENGINEER OF BRIDGES AND STRUCTURES

BILL OF MATERIAL

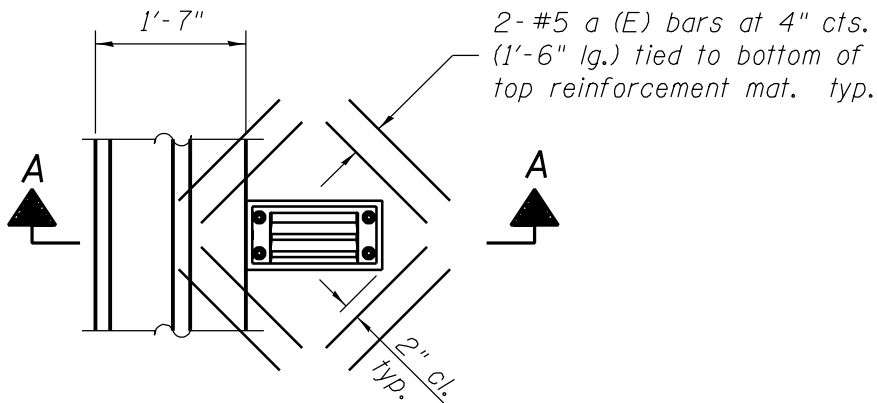
ITEM	UNIT	QUANTITY
Drainage Scupper, DS-33	Each	

DRAINAGE SCUPPER, DS-33



\* Based on 12" flange width.  
May be decreased to 2'-6" by  
allowing 4" of scupper to  
extend under curb. In this case,  
curb must be detailed to allow  
removal of the grate.

**SECTION A - A**



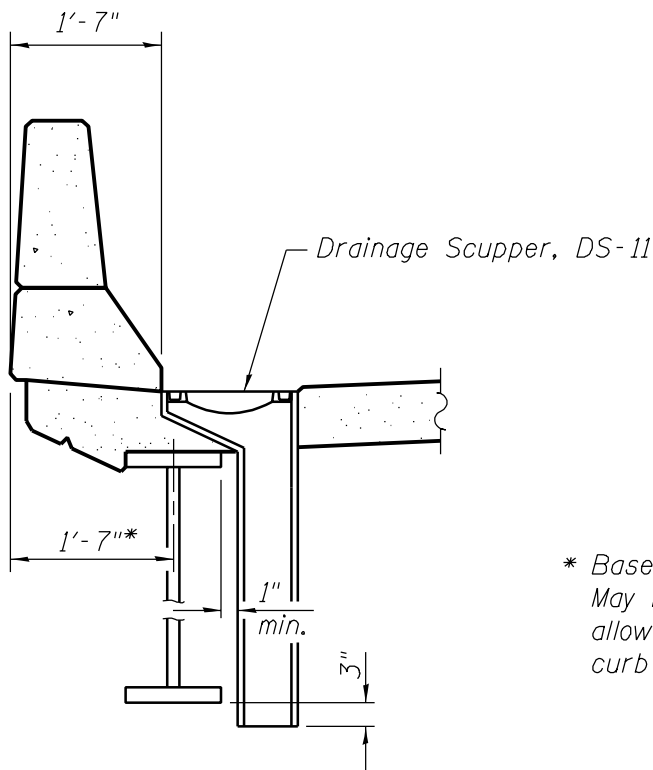
**PLAN**

Note:

Reinforcement bars designated  
(E) shall be epoxy coated.

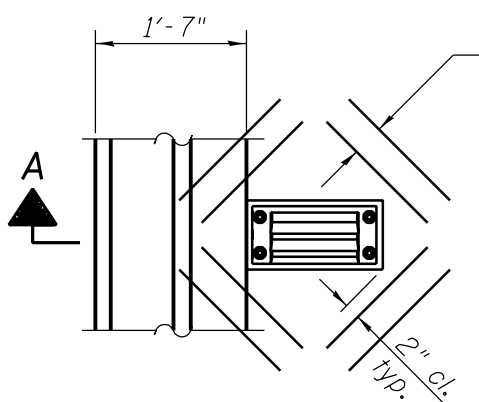
Cut longitudinal reinforcement to  
clear drainage scuppers.

**DRAINAGE SCUPPER  
DS-11**



\* Based on 12" flange width.  
May be increased to 1'-11" by  
allowing 4" space between  
curb and end of scupper.

**SECTION A - A**



2- #5 a (E) bars at 4" cts.  
(1'-6" lg.) tied to bottom of  
top reinforcement mat. typ.

**PLAN**

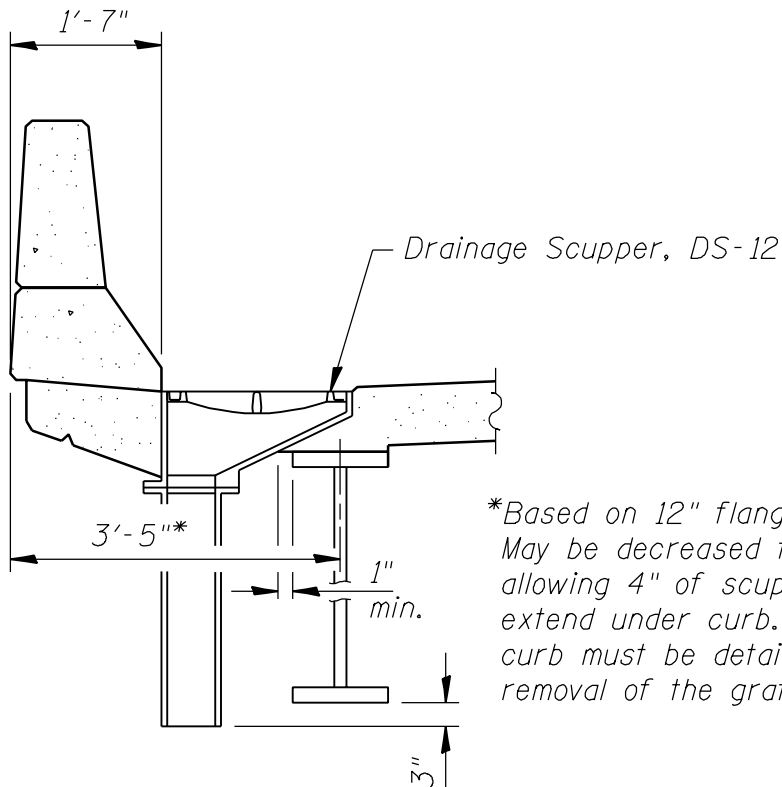
Note:

Reinforcement bars designated  
(E) shall be epoxy coated.

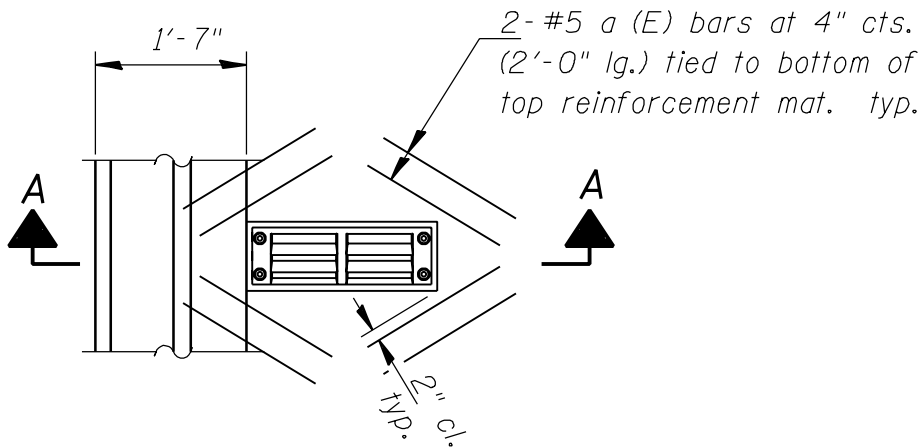
Cut longitudinal reinforcement to  
clear drainage scuppers.

**DRAINAGE SCUPPER  
DS-11**





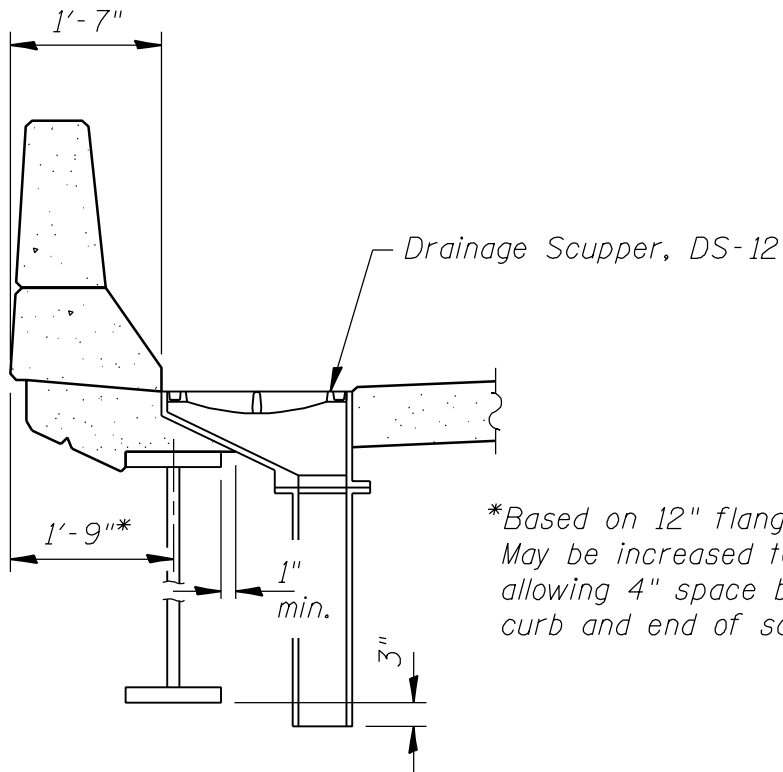
SECTION A - A



PLAN

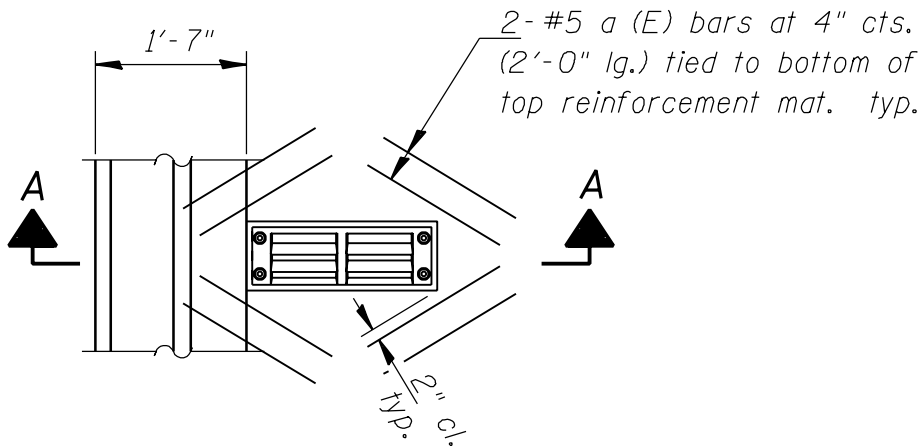
Note: Reinforcement bars designated  
(E) shall be epoxy coated.  
Cut longitudinal reinforcement to  
clear drainage scuppers.

**DRAINAGE SCUPPER  
DS-12**



*\*Based on 12" flange width.  
May be increased to 2'-1" by  
allowing 4" space between  
curb and end of scupper.*

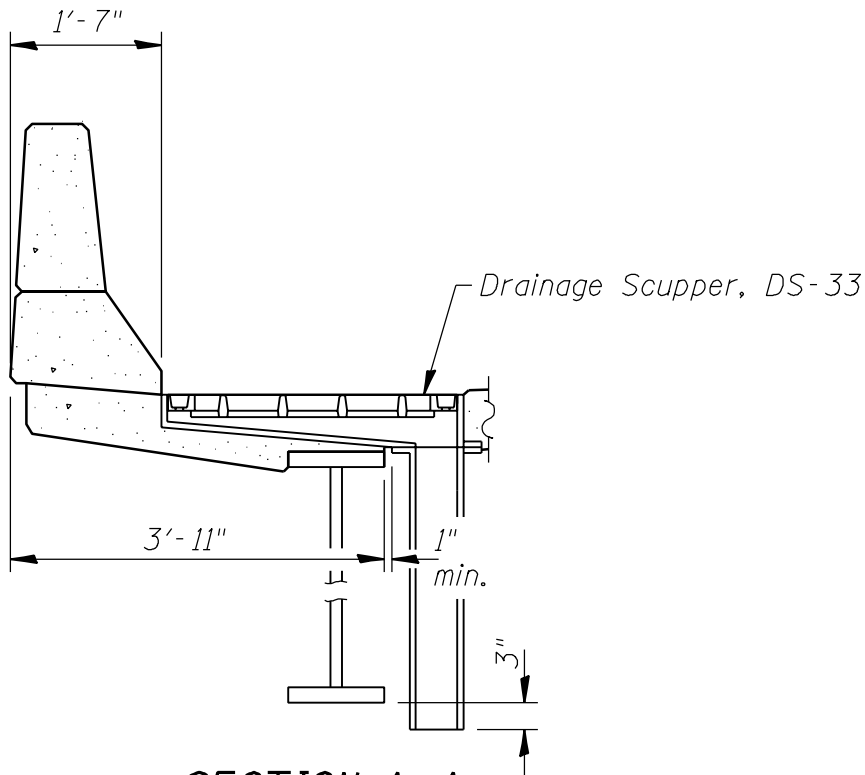
**SECTION A-A**



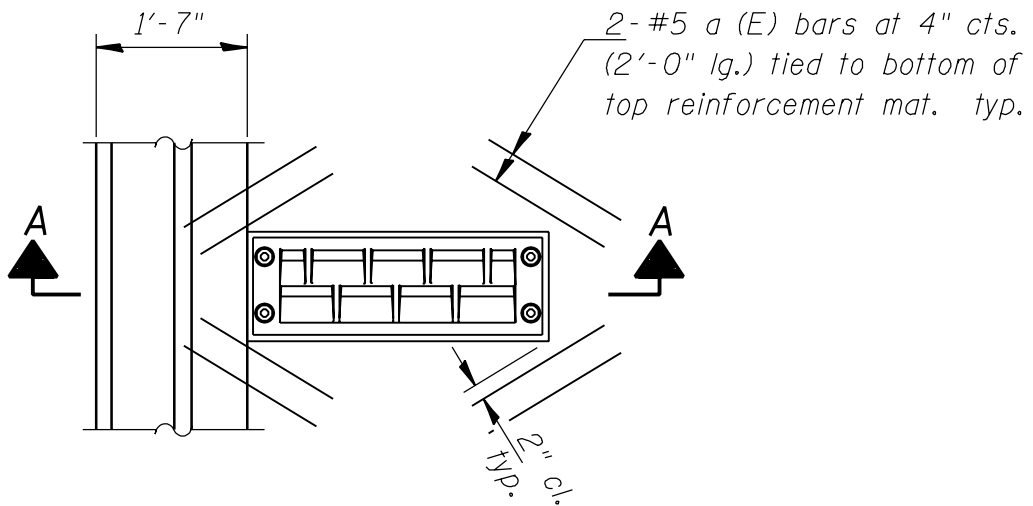
**PLAN**

*Note: Reinforcement bars designated  
(E) shall be epoxy coated.  
Cut longitudinal reinforcement to  
clear drainage scuppers.*

**DRAINAGE SCUPPER  
DS-12**



SECTION A-A



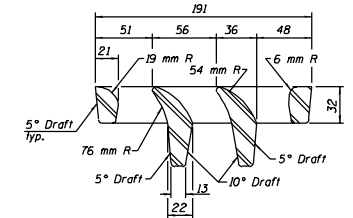
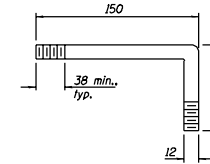
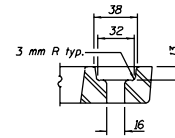
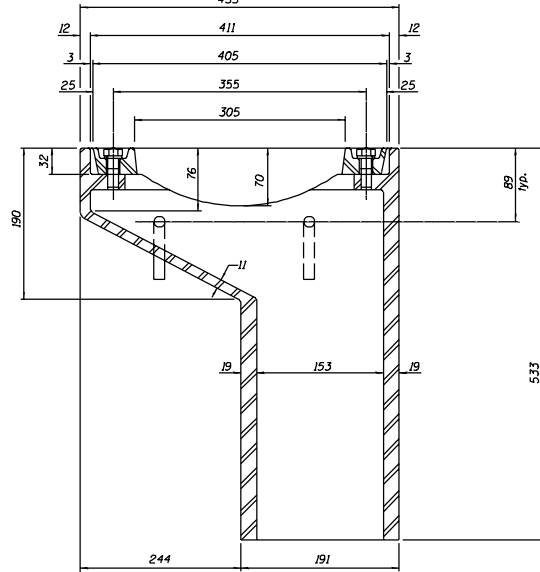
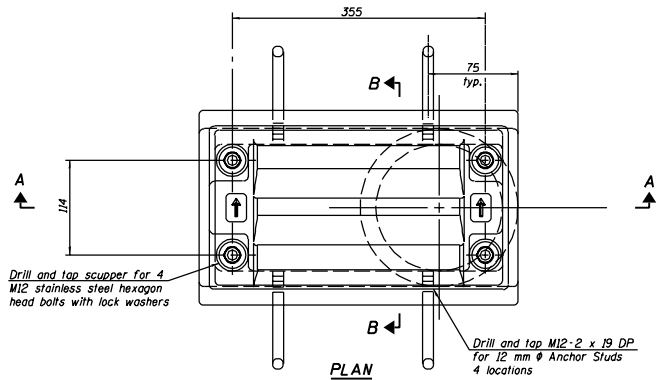
PLAN

Note: Reinforcement bars designated (E) shall be epoxy coated.  
Cut longitudinal reinforcement to clear drainage scuppers.

**DRAINAGE SCUPPER  
DS-33**

STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

SHEET NO.	
SHEETS	



Notes: All cast iron parts shall be gray iron conforming to the requirements of AASHTO M 105, Class 35B.

Bolts, anchor studs, washers and nuts shall conform to the requirements of ASTM A 307 and shall be galvanized according to AASHTO M 232M.

The grate, frame and downspout shall be galvanized according to AASHTO M 111 and ASTM A 305. Downspouts located on the exterior side of a painted steel fascia beam shall be painted with the finish coat specified for the exterior side of the fascia beam.

As an alternate, bolts, anchor studs, washers and nuts may be stainless steel according to Article 1006.29(d) of the Standard Specifications.

Structural steel weldments of equal sections and of the same configuration may be substituted for cast iron. Fillet or full penetration welds shall be used for the weldments. Details shall be submitted to the Engineer for approval.

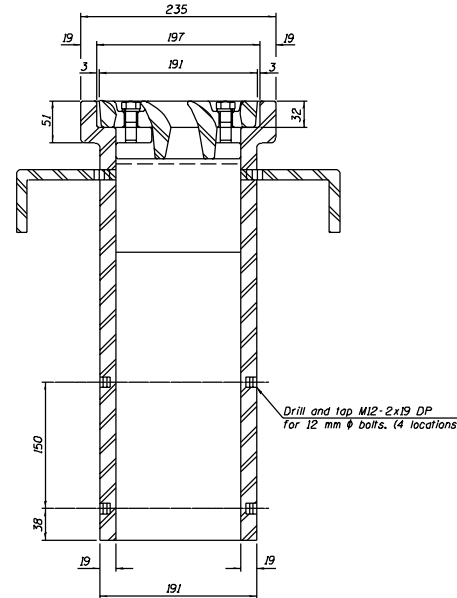
The Contractor shall take appropriate measures to assure that Protective Coat is not applied to the scupper.

Cost of the Grate, Frame, Downspout, Anchor Studs, Bolts, Washers and Nuts including complete installation of the scupper shall be paid for at the contract unit price each for Drainage Scupper, DS-11.

All dimensions are in millimeters (mm) except as noted.

BILL OF MATERIAL

ITEM	UNIT	QUANTITY
Drainage Scupper, DS-11	Each	

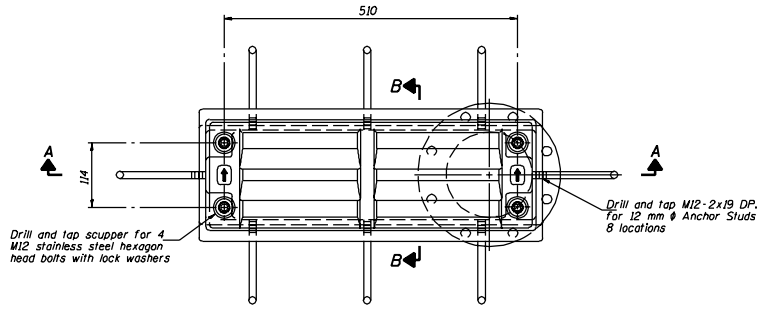


DESIGNED	-
CHECKED	-
DRAWN	-
CHECKED	-

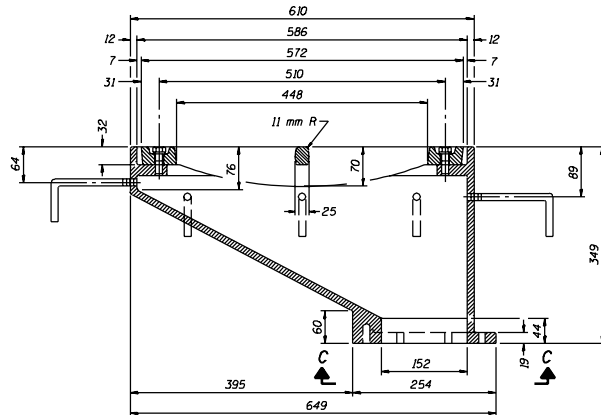
20
EXAMINED
PASSED
ENGINEER OF BRIDGES AND STRUCTURES

STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

SHEET NO.	
SHEETS	

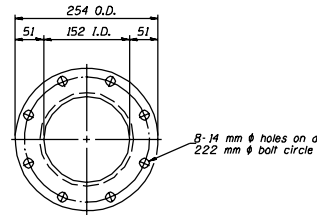


PLAN

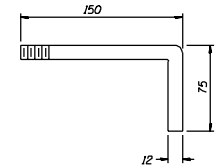


SECTION A-A

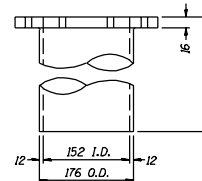
See sheet of for scupper location relative to parapet.



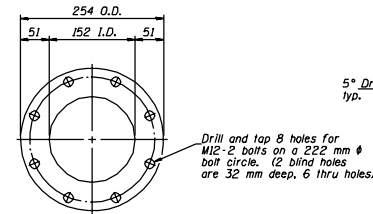
BOLT HOLE DETAIL



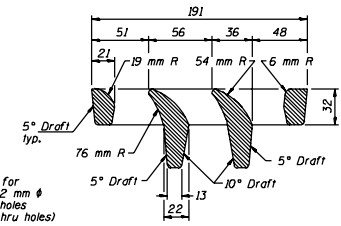
ANCHOR STUD DETAIL



DOWNSPOUT



VIEW C-C



VANE GRATE DETAIL

Notes: All cast iron parts shall be gray iron conforming to the requirements of AASHTO M 105, Class 35B.  
Bolts, anchor studs, washers and nuts shall conform to the requirements of ASTM A 307 and shall be galvanized according to AASHTO M 232W.  
The grate, frame and downspout shall be galvanized according to AASHTO M 111 and ASTM A 385. Downspouts located on the exterior side of a painted steel fascia beam shall be painted with the finish coat specified for the exterior side of the fascia beam.  
As an alternate, bolts, anchor studs, washers and nuts may be stainless steel according to Article 1006.29(d) of the Standard Specifications.  
Structural steel weldments of equal sections and of the same configuration may be substituted for cast iron. Fillet or full penetration welds shall be used for the weldments. Details shall be submitted to the Engineer for approval.  
The Contractor shall take appropriate measures to assure that Protective Coating is not applied to the scupper.  
Cost of the Grate, Frame, Downspout, Anchor Studs, Bolts, Washers and Nuts including complete installation of the scupper shall be paid for at the contract unit price each for Drainage Scupper, DS-12.  
All dimensions are in millimeters (mm) except as noted.

BILL OF MATERIAL

ITEM	UNIT	QUANTITY
Drainage Scupper, DS-12	Each	

DESIGNED	-
CHECKED	-
DRAWN	-
CHECKED	-

EXAMINED	20
PASSED	ENGINEER OF BRIDGE DESIGN
	ENGINEER OF BRIDGES AND STRUCTURES

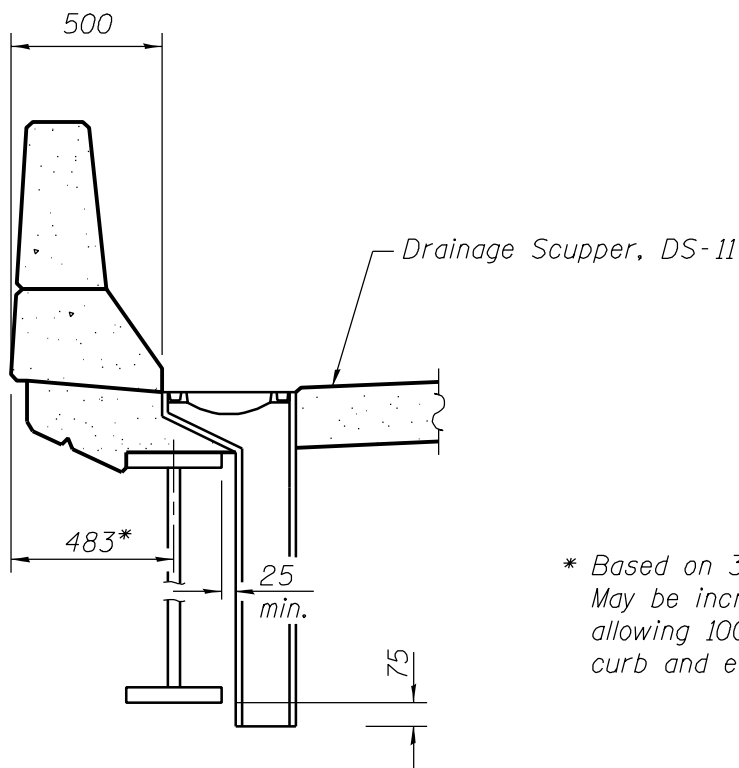
8/1/2000

DRAINAGE SCUPPER, DS-12

NAME	ADDRESS	CITY	STATE	ZIP
PHONE NUMBER		FAX NUMBER		

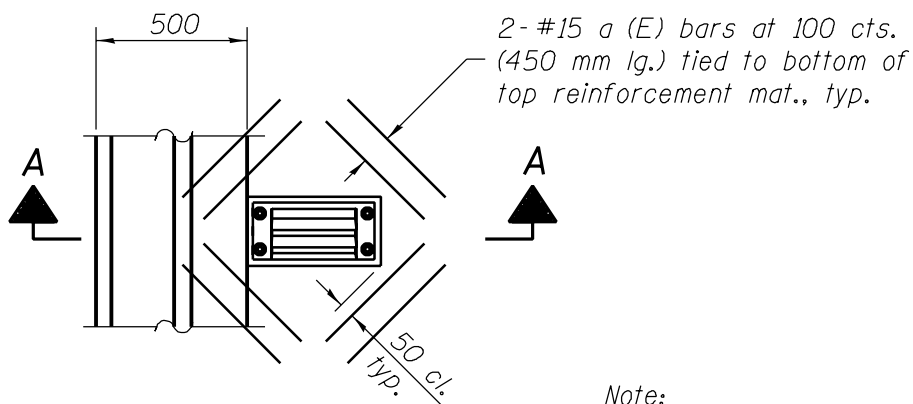
*DRAINAGE SCUPPER, DS-33*





\* Based on 305 mm flange width.  
May be increased to 584 mm by  
allowing 100 mm space between  
curb and end of scupper.

**SECTION A - A**



**PLAN**

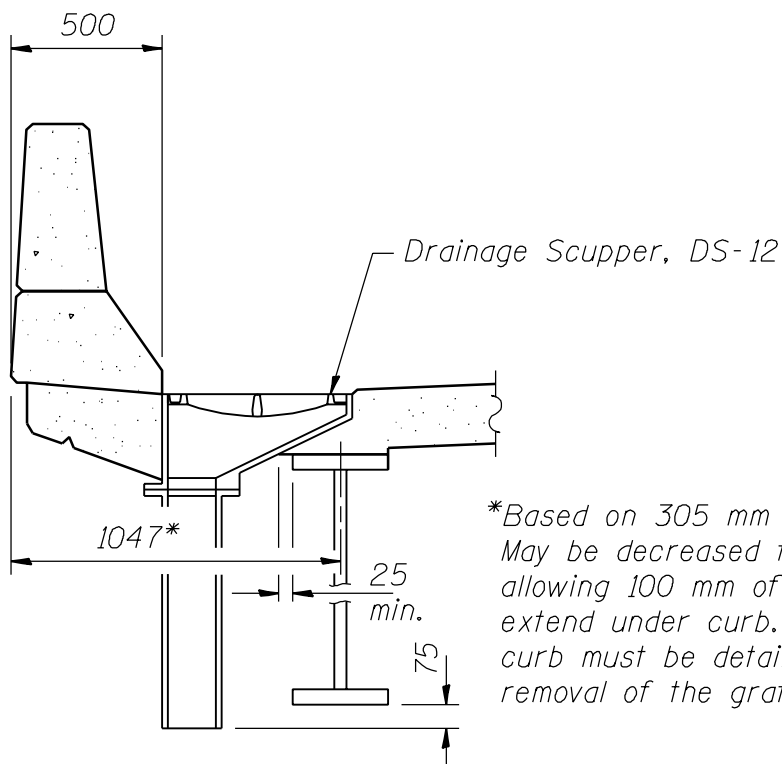
Note:

Reinforcement bars designated  
(E) shall be epoxy coated.

Cut longitudinal reinforcement to  
clear drainage scuppers.

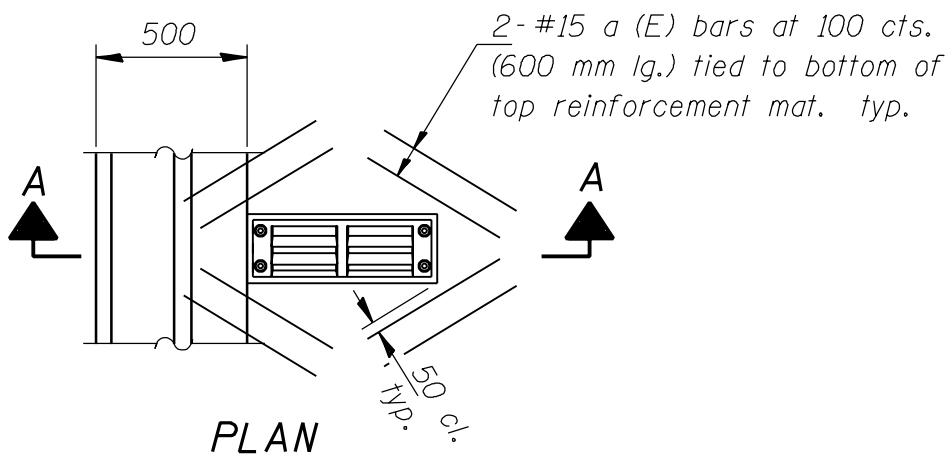
**DRAINAGE SCUPPER  
DS-11**





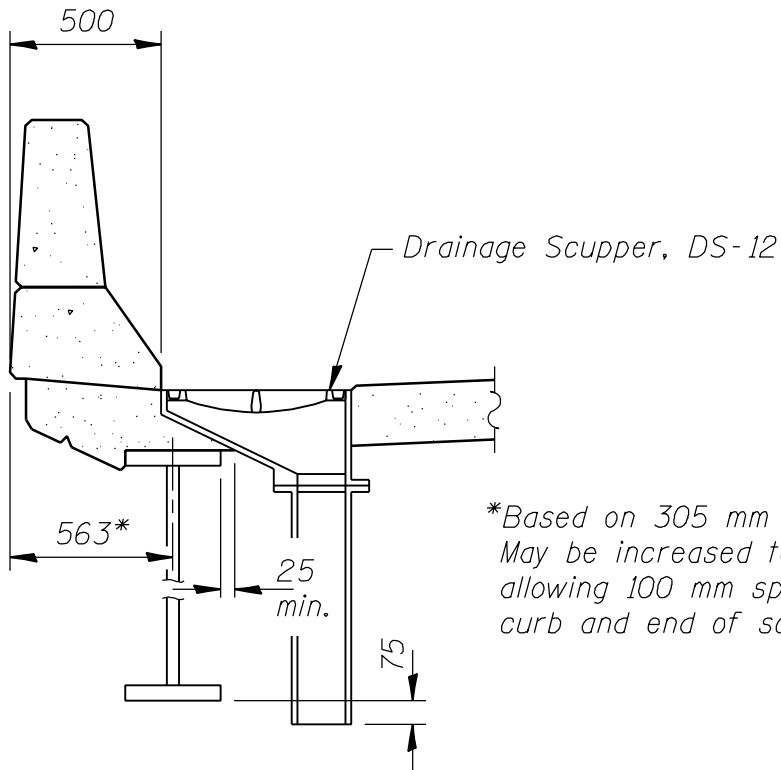
\*Based on 305 mm flange width. May be decreased to 947 mm by allowing 100 mm of scupper to extend under curb. In this case, curb must be detailed to allow removal of the grate.

**SECTION A - A**



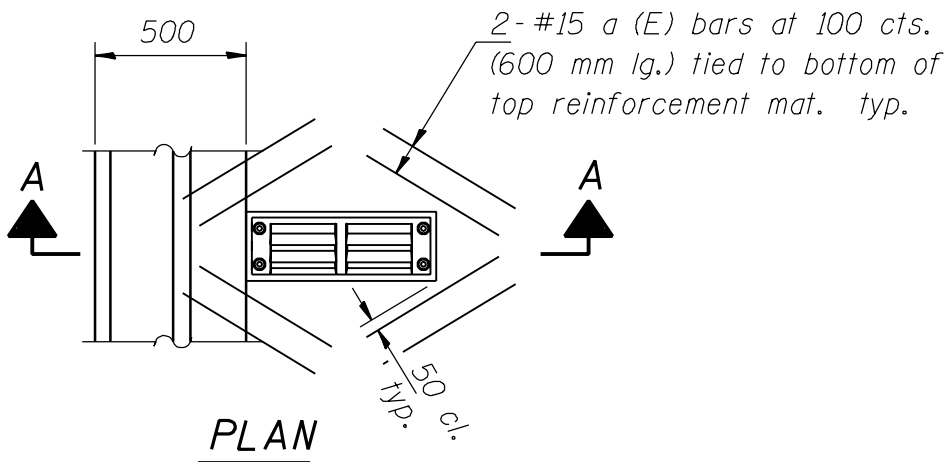
Note: Reinforcement bars designated (E) shall be epoxy coated.  
Cut longitudinal reinforcement to clear drainage scuppers.

**DRAINAGE SCUPPER  
DS-12**



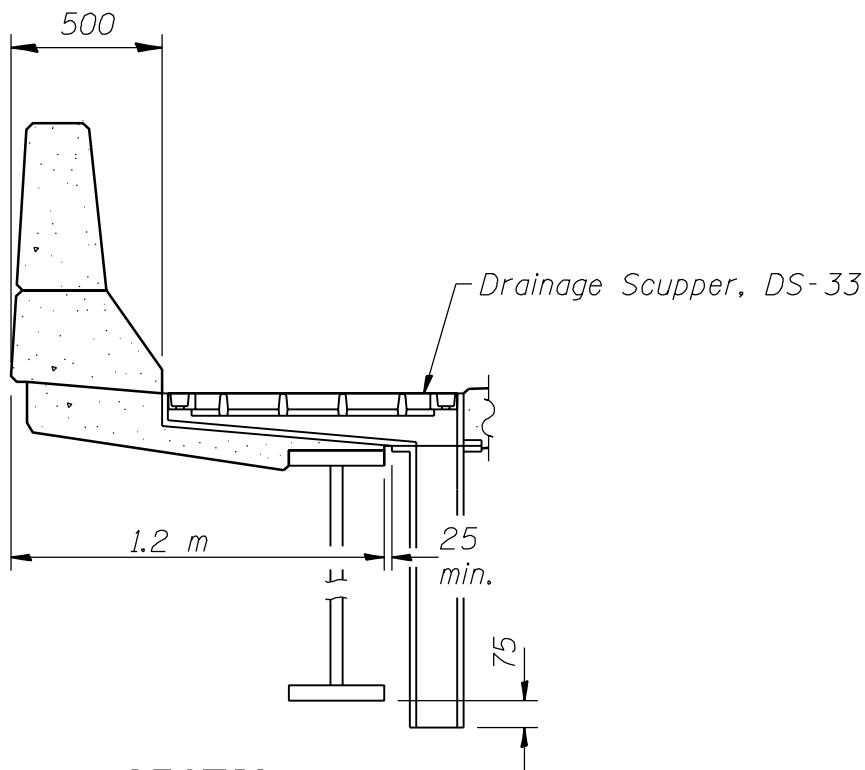
*\*Based on 305 mm flange width.  
May be increased to 663 mm by  
allowing 100 mm space between  
curb and end of scupper.*

**SECTION A - A**

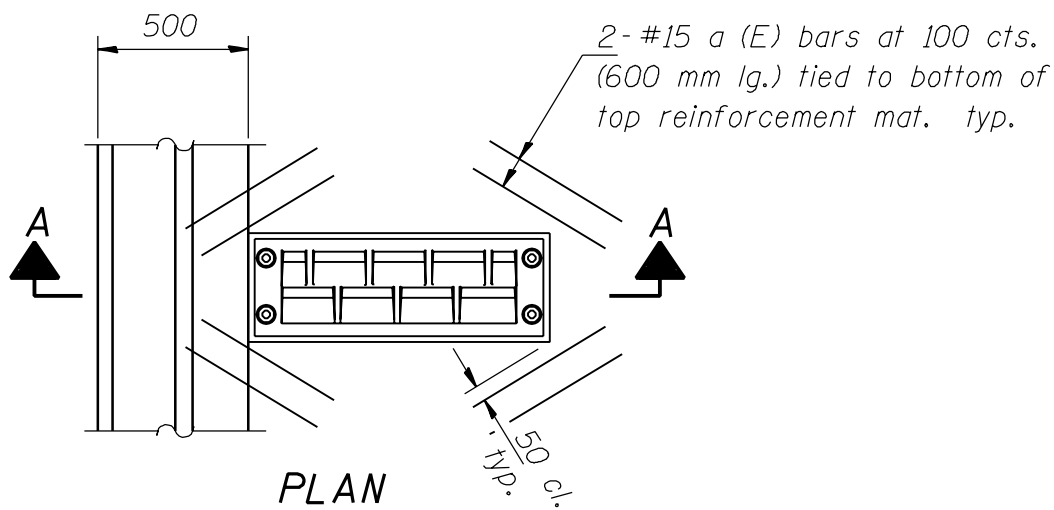


*Note: Reinforcement bars designated  
(E) shall be epoxy coated.  
Cut longitudinal reinforcement to  
clear drainage scuppers.*

**DRAINAGE SCUPPER  
DS-12**



SECTION A - A



PLAN

Note: Reinforcement bars designated (E) shall be epoxy coated.  
Cut longitudinal reinforcement to clear drainage scuppers.

**DRAINAGE SCUPPER  
DS-33**